UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
BAKER, STEPHEN M

ART UNIT	PAPER NUMBER
2133	4

DATE MAILED: 07/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/939,604	CHOI ET AL.
	Examiner	Art Unit
	Stephen M. Baker	2133

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-7</u> is/are pending in the application.

   4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-7</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>28 August 2001</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   a)☒ All b)☐ Some * c)☐ None of:

   1.☒ Certified copies of the priority documents have been received.

   2.☐ Certified copies of the priority documents have been received in Application No. _____.

   3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
   application from the International Bureau (PCT Rule 17.2(a)).

   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3</u>.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Drawings

1.   Figures 1 and 2 should be designated by a legend such as --Prior Art-- because

only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawing sheets

are required in reply to the Office action to avoid abandonment of the application. The

replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as

per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the

changes are not accepted by the examiner, the applicant will be notified and informed of

any required corrective action in the next Office action. The objection to the drawings

will not be held in abeyance.

2.   The drawings are objected to because:

Regarding Fig. 3: the term "MODULATOR" (51, 52) is inconsistent with

conventional terminology, does not perform a complementary function to the

demodulator (60), and apparently should be re-labeled as a "CONVERTER", because

the operation performed by the units (51, 52) apparently is a conversion from a binary

signal representing a bit (0/1) into an ideal symbol value (-1/+1) for the bit. The circuitry

shown in the predecoder (100) of Fig. 3 is not adequate to operate as the predecoder

(100) in the receiver arrangement of Fig. 4. The predecoder (100) of Fig. 3 is

apparently only capable of usefully generating de-punctured parity symbols at its

outputs, and so a pair of multiplexers for combining the de-punctured parity symbols

$(L(y1k)^{\wedge\wedge}, L(y2k)^{\wedge\wedge})$ from the recovery devices (31, 32) with non-punctured parity

symbols (L(y1k), L(y2k)) from the demux (50), with appropriate multiplexing timing control, are apparently omitted. An external output to the turbo decoder (200) from the data symbol output (L(xk)) of the demux (50) is also apparently omitted.

Corrected drawing sheets are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3.   The abstract of the disclosure is objected to because it is confusing, awkwardly worded, vague, elliptical in parts, prolix in other parts and misdescriptive, and apparently should be amended as follows:

A pre-decoder applied to a turbo decoder for decoding a punctured turbo code. The turbo code consists of ~~a data bit stream and~~ a plurality of parity bit streams, parts of which are punctured. The pre-decoder has an arithmetic unit for calculating ~~an estimation value of the~~ estimated parity bit streams by carrying out~~,~~ ~~a same algorithm~~ with respect to the data bit stream~~,~~ the same algorithm ~~which is~~ used by a turbo encoder to produce the parity bit streams, a comparison unit for comparing the plurality of parity bit streams with the ~~estimation value~~ estimated parity bit streams, and a recovery unit for substituting~~,~~ as depunctured symbols ~~the punctured bits~~ of the parity bit streams~~,~~ ~~for bits of the estimation values~~ estimated parity symbols corresponding to the punctured parts when ~~the respective~~ related non-punctured bits of the parity bit streams are identical with ~~the bits of the estimation values corresponding to the punctured parts~~ corresponding estimated non-punctured parity bits. The punctured parity symbols are recovered by the pre-decoder completely, or at least partially, and provided to the turbo decoder. Accordingly, the decoding performance of the turbo decoder is enhanced.

Correction is required. See MPEP § 608.01(b).

4.   The disclosure is objected to because of the following informalities: corrections similar to those suggested for the claims and abstract are suggested for those parts of the specification with similar wording.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5.   Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-7 are confusing, awkwardly worded, vague, elliptical in parts, prolix in other parts and misdescriptive, and apparently should be amended as follows:

1.   A pre-decoder for a turbo decoder for decoding a turbo code consisting of data bits of a data symbol stream and parity bits of a plurality of parity symbol streams, parts of which are punctured, the pre-decoder comprising:

an arithmetic unit for carrying out, ~~a same algorithm~~ with respect to a ~~binary-coded~~ binary-converted data ~~bit~~ symbol stream, the same algorithm that ~~the~~ a turbo encoder performs for generating parity bit streams, and generating ~~an estimation value of the~~ estimated parity bit streams;

a comparison unit for comparing non-punctured bits of the binary-converted parity ~~bit~~ symbol streams with the ~~estimation value~~ estimated parity bit streams generated by the arithmetic unit;

a ~~modulation~~ conversion unit for ~~modulating~~ converting the ~~estimation value of the~~ estimated parity bit streams ~~generated by the calculation unit~~ to ~~the~~ estimated parity symbol streams; and

a recovery unit for recovering punctured parts of the parity symbol streams by substituting, ~~the punctured~~ as de-punctured parts of the parity symbol streams, ~~for values of symbols of the estimation values~~ symbols of the estimated parity symbol streams corresponding to the punctured parts, when ~~the respective~~ related non-punctured bits of the binary-converted parity ~~bit~~ symbol streams are identical with ~~the bits of the estimation values~~ corresponding bits of the estimated parity bit streams, according to a comparison ~~result~~ results of the comparison unit.

2. The pre-decoder as claimed in claim 1, wherein, when ~~it is determined that different bits exist according to the~~ a comparison result ~~of the respective non-punctured bits of the parity bit streams and the bits of the estimation values~~ by the comparison unit indicates disagreement, the recovery unit assigns a predetermined value to a symbol of the punctured parts ~~of the parity symbol input after a symbol corresponding to the different bits~~.

3. The pre-decoder as claimed in claim 1, wherein the arithmetic unit includes a plurality of recursive systematic convolutional (RSC) blocks corresponding to the number of the parity symbol streams, and at least one interleaver for interleaving the binary-converted data ~~bit~~ symbol stream and providing the interleaved binary-converted data ~~bit~~ symbol stream to at least one of the RSC blocks.

4. The pre-decoder as claimed in claim 1, further comprising a ~~binary-coding~~ binary converter unit for generating the ~~binary-coded~~ binary-converted data ~~bit~~ symbol stream and the ~~binary-coded~~ binary-converted parity ~~bit~~ symbol streams by ~~binary-coding~~ binary converting the data symbol stream and the parity symbol streams, and providing the ~~binary-coded~~ binary-converted data ~~bit~~ symbol stream and the binary-converted parity ~~bit~~ symbol streams to the arithmetic unit and the comparison unit, respectively.

5. The pre-decoder as claimed in claim ~~1~~ 4, further comprising a demultiplexer for separating the ~~turbo-code-transferred~~ output from a demodulator into the data symbol stream and the parity symbol streams and

providing the data symbol stream and the parity symbol streams to the <u>binary converter unit</u> ~~arithmetic unit and the comparison unit, respectively~~.

6.   A method for recovering a turbo code consisting of <u>data bits of</u> a data symbol stream and <u>parity bits of</u> a plurality of parity symbol streams, parts of which are punctured, the method comprising the steps of:
          extracting a data symbol stream and a plurality of parity symbol streams from a received turbo code;
          calculating ~~an estimation value of~~ <u>estimated</u> parity ~~bit~~ <u>symbol</u> streams by carrying out, ~~an algorithm~~ with respect to a <u>binary-converted</u> data ~~bit~~ <u>symbol</u> stream corresponding to the <u>extracted</u> data symbol stream, the <u>same</u> algorithm ~~being~~ used by a turbo encoder for producing the parity bit streams corresponding to the <u>extracted</u> parity symbol ~~stream~~ <u>streams</u>;
          comparing ~~the~~ <u>binary-converted</u> parity ~~bit~~ <u>symbol</u> streams corresponding to the parity symbol streams with the ~~estimation value~~ <u>estimated parity bit streams</u>;
          ~~modulating~~ <u>converting</u> the <u>estimated parity bit streams to estimated</u> ~~estimation value to the~~ parity symbol streams; and
          substituting<u>, as depunctured</u> ~~the punctured~~ parts of the parity symbol streams, ~~for a value of a symbol of the estimation values~~ <u>symbols of the estimated parity symbol streams</u> corresponding to the punctured parts, when ~~the respective~~ <u>related</u> bits of the <u>binary-converted</u> parity bit streams are identical with ~~the bits of the estimation values~~ <u>corresponding bits of the estimated parity bit streams</u> according to ~~a~~ comparison ~~result~~ <u>results</u> of the comparison step.

7. The method as claimed in claim 6, further comprising a step of, ~~in the case that different bits exist as~~ <u>responsive to</u> the comparison result of <u>non-equality in</u> the comparison step, assigning a predetermined value to <u>a symbol of</u> the punctured symbols ~~input after a symbol corresponding to the different bits~~.

Allowable Subject Matter

6.   Claims 1-7 would be allowable if rewritten or amended to overcome the

rejections under 35 U.S.C. 112, second paragraph, set forth in this Office action.

Conclusion

7.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Stephen M. Baker whose telephone number is (703)

305-9681. The examiner can normally be reached on Monday-Friday (11:00 AM - 7:30

PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Albert DeCady can be reached on (703) 305-9595. The fax phone number

for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

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For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

Stephen M. Baker
Primary Examiner
Art Unit 2133

smb